TIDAL POWER CORPORATION

ANNUAL REPORT

1985-1986

NOVA SCOTIA

TIDAL POWER CORPORATION

REPORT BY THE CHAIRMAN
ON THE AFFAIRS OF THE CORPORATION
FOR THE YEAR ENDED 31 MARCH, 1986

The Stage 1 study, undertaken as a preliminary step toward development of the Fundy tidal resource, was completed in December, 1985 and the Corporation's report summarizing the results was submitted early in 1986.

The study was funded through the Canada-Nova Scotia Agreement on Oil Substitution and Conservation and conducted pursuant to a contract between the Minister of Mines and Energy, Hon. Joel Matheson, and the Corporation. The originally specified work included engineering, financial and marketing components, to be managed by Alcan Aluminium Limited. Tidal regime investigations and economic analysis were later added to the scope of the work and undertaken or contracted directly by the Corporation.

The engineering portion of the study updated the design for site A8 in Cumberland Basin, placing it on an equal footing with the design for site B9 in Minas Basin. Costs were estimated in 1984 constant Canadian dollars to be $2,560 million for A8 and $7,000 million for B9. The figures in both cases include transmission to Ludlow, Mass. but exclude interest during construction and revenue from energy produced during construction.

The recommended prime mover, subject to continued positive experience at Annapolis, was found to be a single-bearing Straflo turbine with fixed blades and wicket gate regulation operated at variable speed but synchronized within groups of eight

machines. For A8, the design specifies 42 units with total installed capacity of 1,428 MW and annual output of 3,307 GWh per year (net of transmission losses). The corresponding figures for B9 are 128 units, 5,338 MW and 13,780 GWh.

Despite the lower cost of B9 per unit of output, site A8 was selected as the target for first development because of its smaller size, more modest capital requirements, freedom from significant environmental effects on the United States and potential for broader support due to its interprovincial character.

Regime studies undertaken as part of the Stage 1 work indicated that the tidal amplitude along the Gulf of Maine coast would be increased less than had previously been assumed. The average increase is now estimated to be 2 cm for A8 and 12 cm for B9. The impacts due to A8 would clearly be negligible compared to other natural phenomena, including an increase of mean sea level estimated at between 38 cm and 211 cm over the next century.

Financial feasibility was found to depend on securing capital at historic levels of real interest--about 4%. This can be achieved under present conditions through indexed bonds which would shift the burden of inflation from lender to customer.

The marketing studies indicated an interest by New England Power Pool (NEPOOL) in purchasing tidal energy only if the energy could be retimed to provide firm capacity. Hydro-Quebec (HQ) acknowledged that the NEPOOL-HQ energy banking agreement could be used for that purpose, but NEPOOL stated that transmission capacity would be fully used in meeting existing needs. HQ was asked if it would retime tidal power through the New Brunswick intertie and New Brunswick Electric Power Commission expressed willingness to wheel the energy, but no answer has been received from HQ.

Various means of retiming tidal energy are available, each involving a certain cost penalty but adding to the economic value of the energy. Retiming through co-ordinated operation of a large river hydro system (such as HQ's) involves the least penalty, but other possibilities which may be practicable include compressed air energy storage, pumped storage, and co-ordinated operation of gas turbines. More remote possibilities involve hydrogen production and magnetic energy storage.

NEPOOL further expressed interest in importing power from the Maritimes to meet expected needs in the 1990's. A strong transmission link would be required and in NEPOOL's opinion, the necessary regulatory and political support could only be realized if the Maritimes could offer a significant block of power; more than could be provided by A8 alone.

As noted in a previous report, the Annapolis Tidal Generating Station has been transferred to Nova Scotia Power Corporation, but operating results are still of vital interest to this Corporation. In the year under review, the Corporation retained consultants to investigate fish mortality due to passage through the turbine. While far from precise, research results and other observations indicate the probability that mortality is significant. Few fish are being struck by turbine blades and it is suspected that the sudden pressure change encountered in passing through the turbine is responsible. Tolerance to pressure is species specific; salmonids (salmon, trout, char) are little affected, while herring are known to be sensitive.

From what is known to date, the Corporation has concluded that a requisite for environmental feasibility of a large-scale tidal plant in Fundy would be a method for diverting fish (and aquatic mammals) away from the turbines.

Economic analysis based on Stage 1 plant costs indicated that tidal energy from A8, even if retimed by Hydro-Quebec, would not be competitive with other sources available to the Maritime system, where there is little remaining oil dependency and the cost of coal-fired plants is not inordinately inflated by siting and environmental requirements.

Subsequently, in the final months of the year under review, oil prices fell dramatically. The Corporation believes that the present dip is temporary. However, if oil prices should remain indefinitely below $20 U.S. per barrel, there is little chance that development of A8 would be economic.

In the light of study results and the other factors discussed above, it was concluded with regret that the Corporation could not recommend undertaking the pre-commitment phase of A8 development at this time.

Further, it was concluded that in order to establish feasible conditions for proceeding with A8 it would be necessary to find an economic answer to the retiming problem and a practical solution to the fish mortality problem. These will be the Corporation's primary objectives in the ensuing year. With the co-operation of Nova Scotia Power Corporation, arrangements have been made for further research on fish mortality, using the Annapolis turbine, between May and October, 1986.

In order to achieve feasible conditions for the development of B9, the Corporation believes that it would be necessary to have some arrangement for unified environmental regulation and control; one which would protect the project from the delays, uncertainties and risks involved in any proceeding subject to United States law. The Corporation believed (in common with other informed sources) that a

reference of tidal power to the International Joint Commission would be an appropriate way to achieve this objective. The New England Governors and Eastern Canadian Premiers requested such a reference from their national governments during the year. The request was refused by the Canadian Department of External Affairs, and the U. S. State Department subsequently followed suit.

Administrative and Financial.

During the year there were five meetings of the Board of Directors.

The Stage 1 study program as originally defined was estimated to cost $379,000, with a further $121,000 allowance for extras. Careful management by Alcan resulted in completion of the original work within budget. Extra work authorized and completed by Brown Boveri (Canada) Limited, Wilson Associates, Tidal Power Consultants and Discovery Consultants brought the total expenditure to $453,000, well within budget. Alcan made no charge for its executive and administrative costs incurred in managing the study and performing vital parts thereof.

The Corporation functioned within its own administrative budget, despite paying off the balance of capital cost incurred for furnishing the Halifax office. This cash outlay had not been budgeted and was made in response to a decision by the Department of Finance.

Audited financial statements for the fiscal year ended 31 March, 1986 are appended and form part of this report.

All of which is respectfully submitted as of 31 March, 1986.

Ron Barkhouse
Chairman and
Chief Executive Officer

R. Barkhouse

TIDAL POWER CORPORATION

F I N A N C I A L S T A T E M E N T S

MARCH 31, 1986

CONTENTS

	PAGE
Auditors' Report	1
Balance Sheet	2
Statement of Income and Surplus	3
Notes to Financial Statements	4

AUDITORS' REPORT

To the Chairman and Directors of
Tidal Power Corporation

We have examined the balance sheet of the Tidal Power Corporation as at March 31, 1986 and the statement of income and surplus for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion these financial statements present fairly the financial position of the corporation as at March 31, 1986 and the results of its operations for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Halifax, Nova Scotia
May 9, 1986

Doane Raymond
Chartered Accountants

TIDAL POWER CORPORATION

BALANCE SHEET

MARCH 31, 1986

ASSETS	1986	1985
Current		
Cash and short term deposits	$ 32,809	$ 45,110
Accounts receivable	719	3,395,204
	33,528	3,440,314
Office furniture, at cost less accumulated depreciation of $2,682 (1985 - $1,823)	14,504	14,666
	$ 48,032	$3,454,980
LIABILITIES		
Current		
Payables and accruals	$ 30,298	$3,401,094
Payable to Nova Scotia Power Corporation		51,769
	30,298	3,452,863
SURPLUS		
Surplus	17,734	2,117
	$ 48,032	$3,454,980

ON BEHALF OF THE BOARD

Director

Director

TIDAL POWER CORPORATION

STATEMENT OF INCOME AND SURPLUS

YEAR ENDED MARCH 31, 1986

	1986	1985
Income		
Oil Substitution and Conservation Fund (Note 2)	$ 73,000	$379,031
Province of Nova Scotia (Note 3)	232,000	300,000
Interest	278	6,084
	305,278	685,115
Expenses		
Administration, promotion and travel	143,797	250,322
Audit	2,850	2,475
Depreciation - office furniture	859	793
Directors' fees	2,600	3,000
Legal	11,885	9,600
Research studies	127,670	418,912
	289,661	685,102
Excess of income over expenses	15,617	13
Surplus, beginning of year	2,117	2,104
Surplus, end of year	$ 17,734	$ 2,117

TIDAL POWER CORPORATION

NOTES TO FINANCIAL STATEMENTS

MARCH 31, 1986

1. The Tidal Power Corporation was established by Chapter 21 of the Statutes of Nova Scotia, 1970-71. Order-in-Council 71-379 proclaimed that Chapter 21 of the Statutes of Nova Scotia 1970-71, the Tidal Power Corporation Act, came into force on the 22nd day of April, 1971.

2. Oil Substitution and Conservation Fund

   Under an agreement with the Province of Nova Scotia dated March 1984, funds were provided under the Canada-Nova Scotia Agreement on Oil Substitution and Conservation, for a study to determine if output from a selected Fundy tidal power generating site can be marketed at a price ensuring financial feasibility. Expenditures of $73,000 (1985 - $379,031) were incurred during the year. The project is now complete and no further expenditures will be incurred.

3. Pursuant to Section 16 of the Tidal Power Corporation Act, funds for the purpose of carrying out the objects and powers of the Corporation were obtained from the Province of Nova Scotia. Income for the current year is $232,000 (1985 - $300,000).